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Working Paper No. 122

Analysis And Evaluation of Rural Drinking Water Supply in Kumaun Garhwal Region

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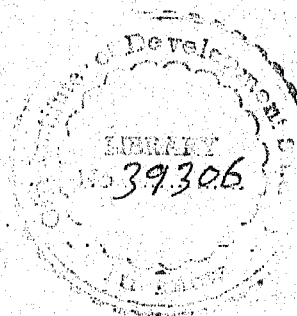
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ANALYSIS AND EVALUATION OF RURAL DRINKING
WATER SUPPLY IN KUMAUN - GARHWAL REGION

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ANALYSIS AND EVALUATION OF RURAL DRINKING
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Water supply systems in their most comprehensive sense include all the water resources, all the water requirements and the complex interrelationships among resources and requirements. As growing population and economic development increase demands for water, it has become imperative to plan optimum resource development in large areas. Highly advanced water systems were built as early as 2500 BC by the Harappans at Mohenjo-daro in the Indus River Basin. In Kumaun-Garhwal region the water sources are rivers, lakes, storage reservoirs, natural springs. Both surface water and ground water sources are used for community water supplies.

The quality of water from different sources varies widely. Precipitation absorbs gases from the atmosphere and then strikes the ground it becomes surface water runoff or enters the ground. In its course, surface water picks up both organic and mineral particles as well as bacteria and other organisms, including odours. Water that enters the ground passes through earth containing organic and mineral matter, and it absorbs minerals and exchange gases. Oxygen usually is removed and carbon dioxide, hydrogen sulfide,

methane, carbonates, sulfates, chlorides, iron, manganese, fluorides, etc. may be acquired.

Pathogenic bacteria and viruses must be eliminated in any water supply system. The source of pathogenic bacteria and viruses is the human body and the bodies of certain other warm-blooded animals. The disease organisms are most commonly transmitted to water supplies by fecal contamination. The most common waterborne diseases are typhoid fever, bacillary dysentery and cholera. Toxic chemicals that must be eliminated from water include lead, arsenic, selenium, chromium, cadmium and bismuth. Nitrates may be dangerous to infants. Fluorides in low concentrations benefit human health by reducing dental caries but in high concentrations may endanger health. Efforts are being made to eliminate these pollutants.

The planning, designing, financing, building and operating of modern community water supply system are becoming more complex. In addition to the extensive engineering problems, other aspects such as the legal, political, social and industrial are becoming increasingly involved.

Water that has been collected and conveyed to its point of use is treated to make it hygienically safe, attractive, palatable and economically suited for its intended uses before it is distributed. The term treatment may refer to a variety of process, including long period storage, aeration, coagulation, sedimentation, softening, filtration,

disinfection and other physical and chemical process. Water treatment works include different processes in varying combinations, depending primarily on the characteristics of the water source but also on intended use. Chlorine is most commonly used for the deinflection of water.

The hill areas of U.P. suffer from acute scarcity of drinking water. Then primary necessity is to provide potable and safe drinking water in rural areas especially under twenty point programmes. As per departmental survey 7771 scarcity villages were identified in 1972. This number has since increased to about 10972 (3201 additional villages) according to the survey onducted by Jal Nigam during 1980. Besides some other villages also suffer from scarcity of safe/potable drinking water. On account of ecological reasons, viz., drying up of water sources, etc. more problem villages are increasing. A high priority is, therefore, assigned for rural drinking water programme during the Seventh Plan period. The main objective will be to provide drinking water facilities to all remaining scarcity villages during the Seventh Plan period. Stress will also be laid on making adequate provision for renovation of defunct schemes.

Under Accelerated Rural Water Supply Programme (ARWSP), it was proposed to provide drinking water facility in 1139 villages including 850 problem villages, out of which 300 villages including 225 problem villages were proposed for 1985-86.

Under Harijan Drinking Water Scheme of Rural Development Department 2769 diggies were likely to be constructed during the Sixth Plan (1980-85) against a target of 2500 diggies. For the Seventh Plan (1985-90) it was proposed to construct 400 diggies, out of which 200 diggies were proposed for 1985-86. The following table shows that out of 75 sample villages in U.P. Hills 40 villages were providing the pipe water supply. In Chamoli and Pauri Garhwal more than 70 per cent sample villages were connected with piped water, whereas more than 50 per cent villages of Dehradun, Tehri Garhwal and Almora are without any water pipe connections.

Table 1 : Percentage of Households Using Different Sources of Drinking Water

District	Villages with tap water supply	Percentage					Total sam- ple village	Total resp- ondent House- holds
		Tap Water	Natural Sources					
		Pri- vate	Comm- unity	Spr- ing	River	Any other		
Almora	7	1.1	38.7	45.6	7.7	6.9	17	274
Pithoragarh	8	3.9	61.7	11.7	2.3	20.4	13	128
Nainital	2	6.1	60.6	33.3	-	-	4	33
Chamoli	3	-	95.5	4.5	-	-	3	22
Uttarkashi	1	-	31.3	6.3	62.4	-	2	16
Pauri Garhwal	13	2.5	55.8	41.7	-	-	18	120
Tehri Garhwal	4	-	8.0	72.2	-	19.8	12	162
Dehradun	2	-	77.6	15.7	6.7	-	6	89
U.P. Hills	40	1.6	45.0	39.6	4.7	9.1	75	844

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

In U.P. Hills, the major drinking water supply sources are community taps and spring providing water to 45.0 per cent and 39.6 per cent households respectively. In Uttarakashi river is the major source of drinking water. On an average only less than 2 per cent households have their own private taps, which shows that either people cannot afford to have their own private tap or they are not satisfied with the tap water supply. Data reveals that the majority of the households using the tap water, i.e. 53.2 per cent are not getting sufficient water. All the households of Tehri Garhwal and Nainital have reported their full dissatisfaction over the quantity of tap water supply, whereas households of Almora, Pauri and Dehradun showing their dissatisfaction are

Table 2

District	% of HH with water supply still using old sources	Percentage of HH reported reasons of still using old sources			
		Less qty. of tap water	Bad qty. of tap water	Crowd on comm. taps	Others
Almora	78.9	63.5	9.6	9.6	17.3
Pithoragarh	90.5	8.8	1.3	32.9	57.0
Nainital	100.0	77.3	22.7	-	-
Chamoli	47.6	53.8	-	7.7	38.5
Uttarkashi	-	-	-	-	-
Pauri Garhwal	84.3	42.2	14.7	22.9	20.2
Tehri Garhwal	100.0	100.0	-	-	-
Dehradun	85.5	59.9	3.4	6.8	33.9
U.P. Hills	82.7	46.8	9.7	16.3	27.2

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

around 60 per cent. Out of the total households using tap water, 82.7 per cent reported that they supplement their water needs from other sources also. In Nainital and Tehri Garhwal cent per cent households have to use other than tap water sources also. Only in Uttarkashi, households depending on tap water need not to go to any other source for water.

One-fourth of the households using tap water in U.P. Hills are not satisfied for the quality of water provided through the pipes. In Nainital and Tehri Garhwal districts households reporting about the bad quality of water are 81.8 and 53.8 per cent respectively which is alarming. All the households of Uttarakashi have not complained against the quality of water supplied to them. There are complains of over crowd on public water taps which is significant

Table 3 : Pipe Water Available to Percentage of Households

District	In Quantity		In Quality	
	Suffi- cient	Insuffi- cient	Satis- factory	Not Satis- factory
Almora	40.4	59.6	79.8	20.2
Pithoragarh	73.8	26.2	96.4	3.6
Nainital	-	100.0	18.2	81.8
Chamoli	66.7	33.3	81.0	19.0
Uttarkashi	100.0	-	100.0	-
Pauri Garhwal	41.4	58.6	65.7	34.3
Tehri Garhwal	-	100.0	46.2	53.8
Dehradun	43.5	56.5	72.5	27.5
U.P. Hills	46.8	53.2	75.3	24.7

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

specially for the households depending on tap water supply in Almora, 9.2 per cent, Pithoragarh, 31.0 per cent and Pauri Garhwal, 35.7 per cent.

There is also positive behaviour towards the tap water supply, that out of 393 tap water users, 145, i.e., 36.9 per cent households reported its usefulness in the entire U.P. Hills households (82 per cent), Nainital (95.5 per cent), Uttarkashi (100.0 per cent) and Tehri Garhwal (100.0 per cent) have reported the utility of the tap water in some way or the other. Among the tap water users, 21.9 per cent households expressed that fetching water from tap is easier than any other source, 8.7 per cent informed that the area under vegetation has increased and 3.1 per cent informed that the frequency of taking bath has increased. In Nainital and Uttarkashi all the households have reported the increase in area under vegetation.

There are specific suggestions of the households to improve the tap water supply. There is a suggestion of 17.0 per cent tap water users that the piped water schemes should be supervised by the permanent staff. 10.4 per cent expressed that the complains of related to tap water should be heeded upon and 7.9 per cent advised that the water schemes should be planned only after a proper survey of water potential is done. It was observed in the field that quite often the villages were connected with pipes, but the source of water was either dried or very low quantity of water was

available in the source for supply. The topography of the region is such, if the water is not supplied with the pressure, then some of the slope areas would be deprived, which is due to less quantity of water. Short period of water flow also deprives the upper parts of hills. Therefore far sightedness and proper planning is important while deciding the water source for constant and even supply of water in all parts of the village.

Table 4 : Percentage of Households Having Accessibility to Water Sources
(in Kms.)

District	0 - 1	1 - 3	3 +
Almora	92.7	7.3	-
Pithoragarh	98.4	1.6	-
Nainital	100.0	-	-
Chamoli	100.0	-	-
Uttarkashi	100.0	-	-
Pauri Garhwal	84.2	13.3	2.5
Tehri Garhwal	92.6	7.4	-
Dehradun	88.8	11.2	-
U.P. Hills	92.5	7.1	0.4

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

Accessibility to water supply sources is an important phenomenon in rural development. Our field data reveals that 92.5 per cent households have less than one kilometre accessibility to any water source, whereas 7.5 per cent have to walk more than one kilometre. In Pauri Garhwal 13.3 and 2.5 per cent households have to walk to fetch the water from 1-3

kms. and beyond 3 kms. respectively. In Dehradun 11.2 per cent households walk upto 3 kms. to bring the water. However, in Nainital and Uttarkashi all the water sources are within one kilometre.

As it is stated earlier that the adverse ecological, phenomenon in U.P. Hills, the condition of the households depending on natural water source is not satisfactory. On the basis of field observations the required quantity and perennial character of natural water sources in all the seasons are gradually becoming doubtful. Among the respondent households, those who do not get the sufficient water from the natural sources are 48.6 per cent. Whereas in Nainital 90.9 per cent respondents reported the scarcity of water in their water sources and in Pauri and Tehri the proportion is 62.0 and 60.4 per cent respectively. Chamoli and Uttarkashi are the only districts where respondent households are fully satisfied in meeting their daily needs of water.

Out of 451 households depending totally on natural water sources, 42.4, 47.2 and 10.4 per cent households have to spent upto 2 hours, 2-5 hours and above 5 hours time respectively in fetching the water for their needs every day. In Pithoragarh, Nainital and Tehri Garhwal, the situation is more bad as proportionately 65.0, 81.8 and 59.1 per cent households respectively have to spent 2 to 5 hours to fulfill their water need. In Pauri Garhwal about one-fifth of the households invariably spent more than 5 hours every day on

fetching water. It clearly shows that the planning and implementation do not keep pace with each other and the valuable time is wasted on fetching the water, besides, the physical exertions on family members. It won't be out of the way to mention here that the middle latitudinal belt of U.P. Hills has a very high sex ratio due to male exodus to the plain areas, the result of it is that the females have to do all household jobs and overall it becomes beyond their physical capacity. Field observations reveal that the malnutrition and heavy work pressure together have made the hill females anemic and weak.

Table 5 : Time (Hours) Spent Everyday on Fetching Water by Households

(in %)

District	% of HH served by natural sources	< 2	2 - 5	5 +
Almora	60.2	55.8	38.8	5.5
Pithoragarh	34.4	20.5	65.9	13.6
Nainital	33.3	18.2	81.8	-
Chamoli	4.5	100.0	-	-
Uttarkashi	68.8	63.	36.4	-
Pauri Garhwal	41.7	46.0	32.0	22.0
Tehri Garhwal	92.0	32.9	59.1	8.1
Dehradun	22.5	40.0	15.0	45.0
U.P. Hills	53.4	42.4	47.2	10.4

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

Whereas the quantity and quality of water is concerned the situation is not very happy. Almost 50 per cent

households out of total 844 households have reported that they do not get sufficient water. Only in district Chamoli and Uttarkashi people are fully satisfied, but in Nainital, the situation is worst as only 9.1 per cent households are satisfied. The following table shows that when sufficient quantity of water is not available to the households, naturally people would either curtail the use of water upto some extent or they would go much beyond the walking limit for water.

Table 6 : Water Available to Percentage of Households

District	Quantity		Quality		
	Suffi- cient	Insuffi- cient	Good	Average	Poor
Almora	58.8	41.2	80.0	10.3	9.7
Pithoragarh	68.2	31.8	68.2	11.4	20.5
Nainital	9.1	90.9	9.1	27.3	63.6
Chamoli	100.0	-	100.0	-	-
Uttarkashi	100.0	-	100.0	-	-
Pauri Garhwal	38.0	62.0	86.0	2.0	12.0
Tehri Garhwal	39.6	60.4	59.7	16.1	24.2
Dehradun	70.0	30.0	75.0	-	25.0
U.P. Hills	51.4	48.6	71.4	11.1	17.5

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

The quality of water is most important factor for general health of population and upto some extent for animals also. Due to bad quality of water, children suffer maximum and the highest mortality rate among them is due to this

reason. In fact in this civilized world the various water supply schemes were first thought because of health problems. Overall in U.P. Hills 71.4 per cent households have reported that they are getting good quality of water, but in Nainital district only 9.1 per cent households get quality of water and 63.6 per cent have reported the bad quality of water. It would be an interesting exercise to correlate with the diseases people suffer in Nainital. In Pithoragarh, Tehri Garhwal and Dehradun above 20 per cent households get poor quality of water from their natural sources.

Table 7 : Percentage Households Wanting Piped Water Supply on Following Reasons

District	To save time and avoid distances	Assured water supply	Good quality of water supply	Any Other
Almora	50.6	26.3	3.8	19.3
Pithoragarh	51.8	16.1	14.3	17.8
Nainital	81.8	18.2	-	-
Chamoli	-	-	-	-
Uttarkashi	-	-	-	-
Pauri Garhwal	43.1	41.3	7.8	7.8
Tehri Garhwal	56.8	24.7	18.5	-
Dehradun	38.5	46.1	15.4	-
U.P. Hills	52.5	27.2	12.3	8.0

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

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Dehradun	38.5	46.1	15.4	-
U.P. Hills	52.5	27.2	12.3	8.0

Source : Based upon Survey conducted by the Author and Project Team of GIDS, Lucknow.

On asking, would like to have piped water supply in your village? The answer was almost affirmative and the above table shows the reasons the households have mentioned. More than half of the total respondents of U.P. hill want the piped water supply to save time and energy in fetching water from far off areas. Whereas in Nainital district 81.8 per cent households need piped water supply due to these reasons. Because due to ecological problems the natural water resources are not reliable for assured water supply, that is why 27.2 per cent households of U.P. Hills want assured water supply through pipe water. In Dehradun and Pauri Garhwal 46.1 and 41.3 per cent households respectively have demanded pipe water for assured supply to fulfil the requirements. Overall for good quality of water supply through pipe is demanded by 12.3 per cent households.

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